

### **REMARKS**

The Office Action dated November 13, 2006, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Applicant respectfully objects to the USPTO's continued failure to update the correspondence address for the present application. A revocation and new power of attorney were filed **almost five years ago**, on April 8, 2002. The failure by the USPTO to update the correspondence address for the present application inevitably results in delay in the prosecution of this application, which is unfair to the Applicant and to the Assignee, Broadcom Corporation. Applicant respectfully requests that the USPTO update its correspondence address at the earliest possible opportunity. Additionally, Applicant respectfully requests that – in the event the correspondence address has not been changed – the USPTO provide a courtesy facsimile of any correspondence responsive to this submission to the number shown below the signature block, so as to minimize the delay associated with the USPTO's failure to update the correspondence address.

A copy of the revocation and new power of attorney are enclosed for the USPTO's convenience.

Claims 1-37 and 39-70 are currently pending in the application, of which claims 1, 18, 21, 30-32, 36, 39, 56, 59, and 68-69 are independent claims. Claims 18, 21, 31-32, 56, 59, and 69 have been amended to more particularly point out and distinctly claim the invention. No new matter has been added. Claims 36-37 have been allowed. Claims 1-35 and 39-70 are respectfully submitted for consideration.

Applicant thanks the Examiner for the indication that claims 36-37 are allowed. Claims 18-29, 31-35, 56-67, and 69-70 were objected to as being dependent upon rejected base claims, but were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 18, 21, 31-32, 56, 59, and 69 have been placed in independent form and claims 19-20, 22-29, 33-35, 57-58, 60-67, and 70 depend respectively from newly independent and clearly allowable claims 18, 21, 32, 56, 59, and 69. Thus, it is respectfully submitted that each of claims 18-29, 31-35, 56-67, and 69-70 recites allowable subject matter, and it is respectfully requested that the objection to claims 18-29, 31-35, 56-67, and 69-70 be withdrawn.

Claims 1-17, 30, 37, 39-55, and 68 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 6,831,893 of Ben Nun et al. ("Ben Nun") in view of U.S. Patent No. 6,628,617 of Karol et al. ("Karol"). The Office Action took the

position that Ben Nun describes all the recitations of independent claims 1, 30, 36, 39, and 68 and related dependent claims, except those “involving limitations of ‘separate flow, forwarding and translation databases to perform the above flow control functions.’” Applicant respectfully traverses this rejection.

Claim 1, upon which claims 2-17 depend, is directed to a method for balancing transmission unit traffic over network links. The method includes disposing transmission units into flows. The method also includes grouping flows into first flow lists, each of the first flow lists corresponding to a selected network link. The method further includes determining a traffic metric representative of a traffic load on the selected network link. The method additionally includes, responsive to the traffic metric, regrouping flows into second flow lists corresponding to the selected network link. The regrouping balances the transmission unit traffic among the network links. The method also includes transmitting the respective second flow list over the respective selected network link.

Claim 30 is directed to a method for balancing transmission unit traffic over heterogeneous speed network links. The method includes disposing transmission units into flows, wherein each of the transmission units includes one of source information, destination information, and a combination thereof. The disposing includes characterizing each of the transmission units according to one of the source information, the destination information, and a combination thereof. Each of the transmission units

includes one of a packet, a frame, a cell, and a combination thereof. The method also includes grouping flows into first flow lists, each of the first decreasing-size-ordered linked flow lists corresponding to a selected network link; determining a traffic metric representative of a traffic load on the selected network link; responsive to the traffic metric, regrouping flows into second decreasing-size-ordered linked flow lists corresponding to the selected network link, the regrouping balancing the transmission unit traffic among the network links; and transmitting the respective second flow list over the respective selected network link using a predetermined link-layer transmission protocol. The predetermined link-layer transmission protocol communicates the transmission unit traffic over the network links in cooperation with a network-layer protocol. The network-layer protocol cooperates with a transport-layer protocol to communicate the transmission unit traffic across the network links, and wherein each of the network-layer protocol and the transport-layer protocol is one of a connectionless protocol and a connection-based protocol.

Claim 39, upon which claims 40-55 depend, is directed to a computer program product recorded on a computer readable medium for balancing transmission unit traffic over network links, including computer readable program code which disposes transmission units into flows. The computer program product also includes computer readable program code which groups flows into first flow lists, each of the first flow lists corresponding to a selected network link. The computer program product also includes

computer readable program code that determines a traffic metric representative of a traffic load on the selected network link. A computer readable program code is included that, responsive to the traffic metric, re-assigns flows into second flow lists corresponding to the selected network link. The re-assigning balances the transmission unit traffic among the network links. A computer readable program code is included that transmits the respective second flow list over the respective selected network link.

Claim 68 is directed to a network load balancer in a communication network having network links. The network load balancer includes a flow synthesizer that receives transmission units from a transmission unit source, and synthesizes flows characteristic of selected transmission units. The network load balancer also includes a link classifier coupled with the flow synthesizer and the network links. The link classifier classifies the network links relative to a predetermined flow metric, and assigns selected flows to selected network links responsive to the predetermined flow metric. The selected transmission units correspond to the selected flows being communicated with the communication network through the respective selected network links.

Applicant respectfully submits that the proposed combination of Ben Nun and Karol fails to teach or suggest all the elements of any of the presently pending claims.

Ben Nun generally relates to an apparatus and method for wire-speed classification and pre-processing of data packets in a full duplex network. Ben Nun generally describes a classifier 260 determining a flow to which a data packet belongs based on the source and destination IP addresses contained in the header HDR of the data packet. *See*, column 8, lines 11-15.

In addition to determining the flow of a data packet based on the IP addresses, the classifier 260 of Ben Nun may also determine the flow based on the source and destination port values contained in the header HDR of the data packet. *See*, column 8, lines 15-34. Furthermore, the classifier 260 can additionally identify a specific flow of the data packet based on the protocol value contained in the header HDR of the data packet. *See*, column 8, lines 34-37.

However, Ben Nun fails to teach or suggest, at least, “grouping flows into first flow lists, each of the first flow lists corresponding to a selected network link,” as recited in independent claim 1. Instead of grouping flows into first flow lists, Ben Nun arranges data packets into a particular flow based on the header information of each data packet. The classifier 260 of Ben Nun may identify a particular flow of the data packet based on the protocol value, but does not teach or suggest that once the flows are identified, these flows are further grouped “into first flow lists” as recited in independent claim 1.

The Office Action took the position that Ben Nun discloses this feature at Figure 2, and column 8, lines 38-42. However, the cited passage simply states that each of the packet processors PP1 to PPN is designated to process packets belonging to a particular flow. For example, processor PP1 may be designated to process data packets from a first flow. The passage – and all of Ben Nun – is silent as to flow lists or grouping the flows into flow lists. Accordingly, Applicant respectfully submits that these features are neither disclosed nor suggested by Ben Nun.

The Office Action, in the “Response to Arguments” section simply cut-and-pasted the Office Action’s statement of the rejection and added, “i.e., it is obvious that the traffic balancing operation at least includes the limitation of “responsive to the traffic metric, regrouping flows into second flow lists corresponding to the selected network link, the regrouping balancing the transmission unit traffic among the network links.” Applicant respectfully disagrees, and respectfully points out that the “regrouping” feature is not the same feature as the “grouping feature.”

A rebuttal of the Office Action’s statement of the rejection has already been provided. Cutting-and-pasting the same statement of rejection neither explains why the clear distinctions presented in the response filed November 1, 2006, (“the Previous Response”) were not persuasive, nor does it meaningful rebut Applicant’s arguments.

Accordingly, Applicant respectfully submits that, if Applicant's arguments cannot be meaningfully rebutted, then the rejection should be withdrawn.

What is left unexplained by the Office Action is how "grouping flows into flow lists" can be met without any disclosure, teaching, or suggestion of flow lists in the cited reference. Indeed, as the cut-and-paste rejection implicitly acknowledged, Ben Nun arranges packets into a flow, not flows into a flow list. Thus, it is respectfully submitted that Ben Nun clearly does not disclose what is claimed, and it is respectfully requested that the rejection be withdrawn.

Applicant respectfully requests that the Examiner reconsider the rejection in light of page 8, lines 13-21, of the present specification, which may help to explain how packets are not flows. Instead, a flow is a "sequence of transmission units," and "a transmission unit is an ordered sequence of data bits, including ... packets." Thus, a flow can be a sequence of packets. Accordingly, it is respectfully submitted that the Office Action's repeated comment: "assigning (grouping) stream of packets (flows)" does not make sense, because it is confuses packets for flows. For this additional reason, it is respectfully requested that the rejection be reconsidered and withdrawn.

In addition, according to Ben Nun, the classifier 260 receives information from each of the packet processors PP1 to PPN indicating the relative load on each of the



packet processors PP1 to PPN. *See*, column 9, lines 28-32. Then, the classifier 260 assigns a new flow to the packet processor PP1, PP2 ... or PPN that has the smallest load.

Ben Nun, therefore, also fails to teach or suggest, at least, “responsive to the traffic metric, regrouping flows into second flow lists corresponding to the selected network link, the regrouping balancing the transmission unit traffic among the network links,” as recited in independent claim 1. Instead, Ben Nun receives information pertaining to the processor PP1 to PPN load of data packets, not of grouped flows as in the present invention.

Ben Nun does not regroup flows into second flow lists. Rather, the classifier 260 of Ben Nun assigns a new flow to the packet processor PP1, PP2 ... or PPN that has the smallest data packet load.

According to Ben Nun, if the classifier 260 determines that the particular data packet belongs to the particular flow and determines that one of the packet processors PP1 to PPN has previously been designated as the particular flow processor, the classifier 260 determines that the particular data packet should be output to the particular data processor. *See*, column 9, lines 32-41. Ben Nun provides loading the packet processors PP1 to PPN based on the flow of a data packet. Ben Nun does not teach or suggest, at least, “regrouping flows into second flow lists,” as recited in independent claim 1.

Instead, based on the load of each packet processor PP1 to PPN or header information in each data packet, the classifier 260 assigns the particular packet processor PP1 to PPN to output the flow associated with the data packet.

The Office Action cited Ben Nun's stream of packets as corresponding to the claimed flows. It is respectfully noted that a stream of packets may correspond to a flow, as explained, for example, by Ben Nun at column 8, line 39. The Office Action then cited Ben Nun's flow as corresponding to the flow list. This is an improper characterization of the art. A flow cannot be a flow list. Even if a flow list contains only a single flow, the flow list and the flow itself are distinct concepts.

The Office Action, in the "Response to Arguments" section simply cut-and-pasted the Office Action's statement of the rejection and added, "i.e., it is obvious that the traffic balancing operation at least includes the limitation of "responsive to the traffic metric, regrouping flows into second flow lists corresponding to the selected network link, the regrouping balancing the transmission unit traffic among the network links." Applicant respectfully disagrees.

A rebuttal of the Office Action's statement of the rejection has already been provided. Cutting-and-pasting the same statement of rejection neither explains why the clear distinctions presented in the Previous Response were not persuasive, nor does it

meaningful rebut Applicant's arguments. Accordingly, Applicant respectfully submits that, if Applicant's arguments cannot be meaningfully rebutted, then the rejection should be withdrawn.

What is left unexplained by the Office Action is how "regrouping flows into second flow lists" can be met without any disclosure, teaching, or suggestion of flow lists in the cited reference. Indeed, as the cut-and-paste rejection implicitly acknowledged, Ben Nun arranges packets into a second flow, not flows into a second flow list. Thus, it is respectfully submitted that Ben Nun clearly does not disclose what is claimed, and it is respectfully requested that the rejection be withdrawn.

Additionally, the Office Action similarly misunderstood Ben Nun with respect to the assigning a new flow to a packet processor that has the smallest load, as described by Ben Nun at column 9, lines 31-35. It is respectfully noted that Ben Nun assigns the flow to a packet processor not based on (or in response to) traffic information, but based on the reported load of the PPN.

Even if assigning the flow to the PPN were in response to traffic information (not admitted), that does not correlate to the claimed "regrouping balancing the transmission unit traffic among the network links."

The Office Action, in the “Response to Arguments” section took the position that Ben Nun discloses “that as the speeds at which networks are capable of transmitting data increase, the speeds at which network components must be able to classify and process data packets must likewise increase ... i.e. it is obvious that the traffic balancing is adaptive and covers over heterogeneous speed network links.” Thus, the Office Action took the position that the feature “balancing transmission unit traffic over heterogeneous speed network links” is anticipated by Ben Nun. Applicant respectfully distinguishes.

What is claimed is not merely “balancing transmission unit traffic over heterogeneous speed network links” but “regrouping balancing transmission unit traffic over heterogeneous speed network links” (emphasis added). Thus, what is claimed is that the regrouping is what balances transmission unit traffic over heterogeneous speed network links, as more precisely set forth in the claims. Accordingly, whether or not Ben Nun teaches some kind of adaptive balancing, Ben Nun certainly does not teach a “regrouping balancing transmission unit traffic over heterogeneous speed network links” (emphasis added) and, therefore, fails to disclose or suggest at least this feature of the claim. It is, therefore, respectfully requested that the rejection be withdrawn.

Certain embodiments of the claimed invention can improve flow of data in a network, by reassigning flows of packets so that they can be transmitted over various links in the network in response to traffic issues. The cited reference merely describes a

network interface with multitasking ability by means a plurality of packet processors. A flow that comes into Ben Nun's network interface directed to a link, will exit the network interface directed to the same link and without any particular relation to the traffic status of that link. In certain embodiments of the present invention, in contrast, the flow may be redirected to another link, or, for another example, may be prioritized in a decreasing size order.

Ben Nun's Figure 2 displays a flow diagram of data within the network interface. Note that the only two physical access layers are one at the upstream side of the flow diagram, and one at the downstream flow diagram. The unlabeled bus to which PP1, PP2, and PPN are attached is not a network. It is an internal bus of a network interface. Thus PP1, PP2, and PPN are not nodes of a network. The chief way in which Ben Nun attempts to achieve some improvement in a network is by processing speed improvements. For example, Ben Nun states that "fewer processors PP1 to PPN are required to process the data packets **transmitted to the network**, and the overall operation of **the network** is enhanced."

Furthermore, contrary to the Office Action's assertions, Ben Nun is not directed to "balancing transmission unit traffic over heterogenous speed network links" as recited in claim 30, or "balancing transmission unit traffic over network links" as recited in claims 1 and 39, nor is it a "network load balancer in a communication network having network

links.” The only kind of balancing that Ben Nun performs is a kind of internal balancing amongst multiple processors in the course of processing the data. In contrast, the claims of the present invention are referring to balancing data “over heterogenous speed network links,” “over network links,” or “in a communication network having network links.”

The Office Action’s “Response to Arguments” section, as noted above, argues that column 3, lines 46-55 of Be Nun discloses this feature. However, as Ben Nun explains, the cited passage is simply a teaching that “network components must be able to classify data packets at extraordinary speeds,” as can be seen at column 3, lines 54-55. It is not a disclosure or suggestion of “balancing transmission unit traffic over heterogenous speed network links” as recited in claim 30, or “balancing transmission unit traffic over network links” as recited in claims 1 and 39, nor does it disclose or suggest a “network load balancer in a communication network having network links.” Instead, it simply notes that as technology improves, network speeds increase and network components’ ability to process packets on the network needs to correspondingly increase. Thus, Applicant respectfully submits that Ben Nun fails to disclose the above-identified features, it is respectfully requested that the rejection be withdrawn.

Karol does not remedy the deficiencies of Ben Nun, and thus the combination of Karol and Ben Nun fails to disclose or suggest all of the elements of any of the presently pending claims.

Karol is generally related to a technique for internetworking traffic on connectionless (CL) and connection-oriented (CO) networks. Karol generally describes CL-CO gateways and the accompanying hardware and software modules.

The Office Action cited Karol only for having several types of databases. Whether Karol discloses such databases is moot. Karol does not teach the features of the claim that Applicant has noted that Ben Nun does not teach. Therefore, Karol does not remedy the deficiencies of Ben Nun, and the combination of Ben Nun and Karol cannot disclose or suggest all of the elements of any of the presently pending claims. Applicant respectfully points out that the Office Action does not dispute that Karol does not remedy the above-identified deficiencies of Ben Nun.

Additionally, there is no motivation to combine Ben Nun and Karol. Karol is directed to a CL-CO gateway. Ben Nun is directed to a network interface in an implicitly CL network (note Ben Nun's header processor 250). Thus, Ben Nun could not serve as Karol's CL-CO gateway, even if databases were added to Ben Nun. Accordingly, one of ordinary skill in the art would not be motivated to combine Ben Nun and Karol.

The Office Action took the position that the motivation for the combination would have been "to maintain separate flow, forwarding, and translation databases in a gateway

processor to perform the above flow control functions” and cited Karol, at column 6, lines 30-59. However, the cited passage does not suggest any such thing. Thus, Applicant respectfully disagrees with the Office Action’s position, and respectfully requests that the rejection be withdrawn.

Moreover, whether or not Karol elsewhere discloses “to maintain separate flow, forwarding, and translation databases in a gateway processor to perform the above flow control functions,” Karol only discusses the usefulness of such a function in a gateway between a CO and a CL network. Ben Nun is not addressed to such a gateway, and thus would not have need of an invention aimed to improve such a gateway.

The Office Action, in the “Response to Arguments” section took the position that Ben “teaches a network monitoring and classifying for balancing transmission unit traffic over network links,” and that Karol teaches “a similar application for balancing transmission unit traffic using a gateway processor to maintain flow forwarding, translation and databases” and concluded “it is obvious that Karol et al. and Ben Num [sic] et al. can be reasonably combined.” Applicant respectfully disagrees.

Applicant respectfully points out that the Office Action’s response fails to address either that “Ben Nun could not serve as Karol’s CL-CO gateway, even if databases were added to Ben Nun” (as mentioned in the Previous Response), that the cited passage of



Karol does not teach what the Office Action asserted, or that even if Karol had disclosed what the Office Action asserted, it would teach that only in the context of a gateway, which is not something found in Ben Nun.

Applicant respectfully submits that a prima facie case of obviousness cannot be established without motivation to combine, and that motivation to combine cannot be established simply by pointing out general similarities between the teachings of the references (meanwhile ignoring the differences and the infeasibility of the combination). Accordingly, it is respectfully submitted that the Office Action fails to provide proper teaching, motivation, or suggestion to combine the references, and, thus, it is respectfully requested that the rejection be withdrawn.

Accordingly, in view of the foregoing, it is respectfully asserted that Ben Nun and Karol do not teach or suggest all the elements of any of claims 1, 30, 39, or 68. It is, thus, respectfully requested that the rejection of claims 1, 30, 39, and 68 be withdrawn.

Claims 2-17, 37, and 40-55 depend respectively from, and further limit, claims 1, 36, and 39. Applicant respectfully submits that claims 2-17, 37, and 40-55, therefore, recite subject matter that is neither disclosed nor suggested in the cited combination of Ben Nun and Karol. It is, thus, respectfully requested that the rejection of claims 2-17, 37, and 40-55 be withdrawn.

For the reasons explained above, Applicant respectfully submits that each of claims 1-35 and 39-55 recites subject matter which is neither disclosed nor suggested in the cited prior art. Claims 36-37 have already been allowed. Applicant therefore respectfully requests that all of claims 1-37 and 39-70 be allowed, and that this application be passed to issue.

In the event this paper is not being timely filed, Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

A handwritten signature in black ink, reading "Peter Flanagan", written over a horizontal line.

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